

1 13. (Twice Amended) A lead frame for an integrated circuit chip having a frame-engaging
2 bottom surface, comprising a plurality of unitary sidebars, each of said sidebars having an inner side
3 and an outer side, said sidebars defining a central aperture, said frame being sized to be
4 accommodated entirely within corresponding outer edges of the circuit chip, each side bar having an
5 upper chip-supporting surface for engaging the bottom surface of the chip.

REMARKS

Applicants thank the Examiner for the courtesies shown Applicants' representative during the November 5, 2001 telephone interview.

The Amendment amends claims 1, 12 and 13. The attached "VERSION WITH MARKINGS TO SHOW CHANGES MADE" shows changes made to the amended claims with deletions bracketed and additions underscored. Claims 1-15 are pending in the Application.

THE 35 U.S.C. §102 CLAIM REJECTIONS

The Office Action rejects claims 1-15, under 35 U.S.C. §102(b), as being anticipated by Kitano *et al.* or Yoo *et al.* The Amendment amends claims 1, 12 and 13. Neither Kitano *et al.* nor Yoo *et al.* anticipate amended claims 1, 12 and 13. Applicants respectfully traverse the rejection of claim 14.

The invention of claims 1, 12 and 13 is a "lead frame . . . comprising a plurality of unitary sidebars . . . defining a central aperture [and] . . . a chip-support zone . . . smaller in each dimension than a corresponding dimension of the chip. . ." The invention of amended claim 14 is a lead frame which is "generally circular and defin[es] a peripheral edge . . . disposed within an outer chip edge . . ."

In contrast to the invention of claims 1 and 12-14, Kitano, in Figs. 2, 6, 15-17, 20 22-25, 27, 29 and 30, shows a chip 4 mounted on a chip pad 1 that is coextensive with or larger than the mounting surface of the chip.

A difference between Kitano and the invention of claims 1 and 12-14 is that the Kitano chip pad is as large or larger than the chip, while the invention of claims 1 and 12-14 is a chip-support zone that is smaller in each dimension than a corresponding dimension of the chip.

A significance of this difference is that the claimed invention prevents fillet formation and deleterious delamination occasioned by cyclical thermal stress between the chip and lead frame.

Also contrast to the invention of claims 1, 12 and 13, Yoo *et al.* describes, as depicted in Fig. 3, damping members b_1 to b_4 interposed between support members a_1 to a_4 , defining a generally square-shaped lead frame. As depicted in Fig. 6, Yoo *et al.* describes "X-shaped support members a_7-a_{10} . . . connected at one-side ends thereof together by thin damping members b_6 to b_9 ," (5:6-9), also defining a generally square-shaped lead frame.

A difference between the disclosure of Yoo *et al.* and the invention of claims 1, 12 and 13 is that Yoo *et al.* describes damping members interposed between support members, while the invention of claims 1, 12 and 13 is a plurality of unitary sidebars.

A significance of this difference is that the Yoo *et al.* support members and damping members define a discontinuous mounting surface which exhibits correspondingly discontinuous thermal expansion characteristics which encourages, rather than discourages, delamination between the chip and chip pad.

Another difference between the disclosure of Yoo *et al.* and the invention of claims 1, 12 and 13 is that Yoo *et al.*, in Fig. 6, describes crossed support members, while the invention of claims 1, 12 and 13 is a plurality of unitary sidebars that define a central aperture.

A significance of this difference is that crossed members rigidly maintain the orientation of the damping members instead of allowing contortion responsive to thermal stress caused by non-uniform thermal expansion characteristics of a chip.

A difference between the disclosure of Yoo *et al.* and the invention of claim 14 is that Yoo *et al.* describes a generally square-shaped lead frame, while the invention of claim 1, 12 and 13 is a lead frame which is generally circular.

It is found that delamination failure starts at the pad shoulder and propagates to the entire pad. When shoulder pad (as well as fillet formation) is eliminated, delamination will be overcome in the current invention. This point is currently covered in claim 12.

The circular shape of the leadframe of claim 14 provides a die pad that is smaller than the chip (small) with an aperture (window) that can eliminate pad shoulder and fillet formation. The shape of the small window is insignificant. As neither Yoo *et al.* nor Kitano *et al.* mention a small window leadframe, such do not anticipate the small window design in the current invention.

Kitano and Yoo *et al.* do not teach every aspect of claims 1 and 12-14, therefore claims 1 and 12-14 and dependent claims 2-11 and 15 are allowable over Kitano and Yoo *et al.*

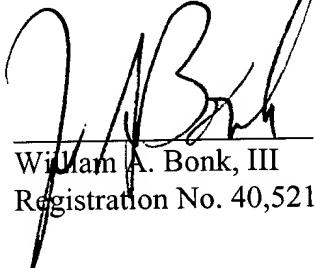
Applicants respectfully submit that this Application is in condition for allowance. If such is not the case, Applicants invite the Examiner to contact the undersigned to resolve remaining issues.

This Amendment is responsive to the outstanding Office Action. The Amendment does not add new matter. The Amendment does not raise new issues that require further consideration and/or searching and is a *bona fide* effort to conclude prosecution of this Application. Applicants respectfully request entry and favorable consideration of the Amendment.

Applicants respectfully submit that this Application is in condition for allowance. If such is not the case, Applicants invite the Examiner to contact the undersigned to resolve remaining issues.

This paper was not filed within the shortened statutorily-prescribed time limit, thus is accompanied by a petition for the appropriate time extension and required fee. If filing this paper or any accompanying papers necessitates additional fees not otherwise provided for, the undersigned authorizes the Commissioner to deduct such additional fees from Deposit Account No. 04-2223.

Respectfully Submitted,



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VERSION WITH MARKINGS TO SHOW CHANGES MADE

1 1. (Twice Amended) A lead frame, for an integrated circuit chip having a frame
2 engaging bottom surface, comprising[:] a plurality of unitary sidebars, each of said sidebars having
3 an inner side and an outer side, said inner sides defining [an] a central aperture, said outer sides
4 defining a chip-support zone, said zone being smaller in each dimension than a corresponding
5 dimension of the chip, each sidebar having an upper chip-supporting surface for engaging the bottom
6 surface of the chip.

1 12. (Amended) A lead frame for connecting and supporting an integrated circuit chip
2 having an outer chip edge, comprising[:] [an apertured] frame including interconnected unitary side
3 bars defining a central aperture and an outer frame edge, said frame edge being disposed within the
4 outer chip edge, thus having no shoulder, and therefore minimizing filet formation, and haven a
5 contact surface for securing the chip thereto.

1 13. (Twice Amended) A lead frame for an integrated circuit chip having a frame-
2 engaging bottom surface, comprising[:] a plurality of unitary sidebars, each of said sidebars having
3 an inner side and an outer side, said sidebars defining [an] a central aperture, said frame being sized
4 to be accommodated entirely within corresponding outer edges of the circuit chip, each side bar
5 having an upper chip-supporting surface for engaging the bottom surface of the chip.